

Date: Friday, 09/03/2007 2:26:24 PM
User: Linda Lacelle

Process Sheet

Customer : CU-DAR001 Dart Helicopters Services	Drawing Name : BRACKET
Job Number : 31156	
Estimate Number : 10810	
P.O. Number : <i>N/A</i>	Part Number : D3177041
This Issue : 09/03/2007 S.O. No. : <i>N/A</i>	Drawing Number : D3177 REV B2
Prsht Rev. : NC	Project Number : N/A
First Issue : <i>N/A</i> Type : MACHINED PARTS	Drawing Revision : B2
Previous Run : 24923	Material : <i>N/A</i>
Written By : <i>[Signature]</i>	Due Date : 16/03/2007 Qty: 2 Um: Each
Checked & Approved By : <i>[Signature]</i>	
Comment : Est Rev:B 03.01.27 Added Step 12 KJ/RF	

Additional Product

Job Number:





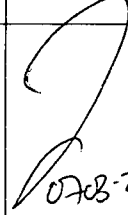

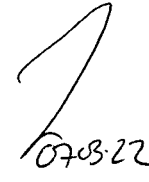
Seq. #:	Machine Or Operation:	Description :
1.0	M6061T6B1000X12000	6061-T6 Bar 1.0" x 12.0"
	Comment: Qty.: 2.0747 f(s)/Unit Total : 4.1494 f(s) Material: 6061-T6 (QQ-A-200/8) or (QQ-A-250/11) 1.00" thick (M6061T6B1.000x12.000 or M6061T6S1.000) Batch: <i>019601</i> <i>md 07/03/09</i> 3	
2.0	BAND SAW	BAND SAW
	Comment: BAND SAW Cut blank: 47.40" x (12.000" +0.100/-0.000) <i>md 07/03/09</i> 3	
3.0	HAAS1	HAAS CNC VERTICAL MACHINING #1
	Comment: HAAS CNC VERTICAL MACHINING #1 1-Machine part as per Folio FA291 and Dwg D3177 2-Deburr <i>SA 07.03.12</i>	
4.0	QC2	INSPECT PARTS AS THEY COME OFF MACHINE
	Comment: INSPECT PARTS AS THEY COME OFF MACHINE <i>SA 07.03.12</i>	
5.0	QC8	SECOND CHECK
	Comment: SECOND CHECK	

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
070322	3.0	Parts are under size & under tolerance.	 07/03/22	Scraps: des tray, No replace. See attached e-mail.	 07/03/22	 0703-22		 0703-22

NOTE: Date & initial all entries

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Job Number:



Seq. #:

Machine Or Operation:

Description :

6.0

HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat as per QSI 005 4.1

7.0

D31775

Spacer



Comment: Qty.: 4.0000 Each(s)/Unit Total : 8.0000 Each(s)

Pick:

Qty Part Number Description Batch

4 D3177-5 Spacer

8.0

SMALL FAB 1

SMALL & MEDIUM FAB RESOURCE 1



Comment: SMALL & MEDIUM FAB RESOURCE 1

1-Press D3177-5 Spacers as shown on Dwg D3177

9.0

POWDER COATING

POWDER COATING



Comment: POWDER COATING

Powder Coat White Gloss (Ref: 4.3.5.1) as per QSI 005 4.3

10.0

QC3

INSPECT POWDER COAT/CHEMICAL CONVERSION



Comment: INSPECT POWDER COAT/CHEMICAL CONVERSION

11.0

D26906

Lanyard



Comment: Qty.: 1.0000 Each(s)/Unit Total : 2.0000 Each(s)

Pick:

Qty Part Number Description Batch

1 D2690-6 Lanyard

12.0

AN960JD10

Washer



Comment: Qty.: 3.0000 Each(s)/Unit Total : 6.0000 Each(s)

Pick:

Qty Part Number Description Batch

3 AN960JD10 Washer

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W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Date: Friday, 09/03/2007 2:26:24 PM
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Job Number: 31156

Part Number: D3177041

Job Number:



Seq. #:

Machine Or Operation:

Description :

13.0

BLRS010

Pip Pin



Comment: Qty.: 1.0000 Each(s)/Unit Total : 2.0000 Each(s)

Pick:

Qty Part Number Description Batch

1 BLRS-010 Pip Pin _____

14.0

MS21042L3

Nut



Comment: Qty.: 1.0000 Each(s)/Unit Total : 2.0000 Each(s)

Pick:

Qty Part Number Description Batch

1 MS21042L3 Nut (or -3) _____

15.0

MS27039111

Screw



Comment: Qty.: 1.0000 Each(s)/Unit Total : 2.0000 Each(s)

Pick:

Qty Part Number Description Batch

1 MS27039-1-11 Screw _____

16.0

SMALL FAB 1

SMALL & MEDIUM FAB RESOURCE 1



Comment: SMALL & MEDIUM FAB RESOURCE 1

Assemble as per Dwg D3177

17.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

18.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Identify and Stock

Location: _____

Date: Friday, 09/03/2007 2:26:25 PM
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Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: BRACKET

Job Number: 31156

Part Number: D3177041

Job Number:



Seq. #:

Machine Or Operation:

Description :

19.0

QC21

FINAL INSPECTION/W/O RELEASE



Comment: FINAL INSPECTION/W/O RELEASE

Job Completion



U 87-04-25

D3065-5DART AEROSPACE LTD		Work Order: 31156
Description: Bracket		Part Number: D3177-1
Inspection Dwg: D3177	Rev: B2	Page 1 of 1

FIRST ARTICLE INSPECTION CHECKLIST

☒ First Article ☐ Prototype

Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
0.970	+0.010/-0.000					
R0.125	+/-0.010	1.125	/			
0.700	+0.010/-0.000	708	/			
0.188	+0.010/-0.000	.192	/			
0.300	+/-0.010	.300	/			
10.776	+/-0.005	10.777	/			
R0.625	+/-0.010	R0.625	/			
Ø0.261	+0.005/-0.000	Ø.261	/			
0.200	+/-0.010	.198	/			
0.970	+0.010/-0.000					
Ø0.203	+/-0.005	Ø.203	/			
Ø0.625	+0.001/-0.000	Ø.625	/			
3.733	+0.000/-0.005	3.732	/			
0.970	+0.010/-0.000					
0.700	+0.010/-0.000					

540
95
2500e

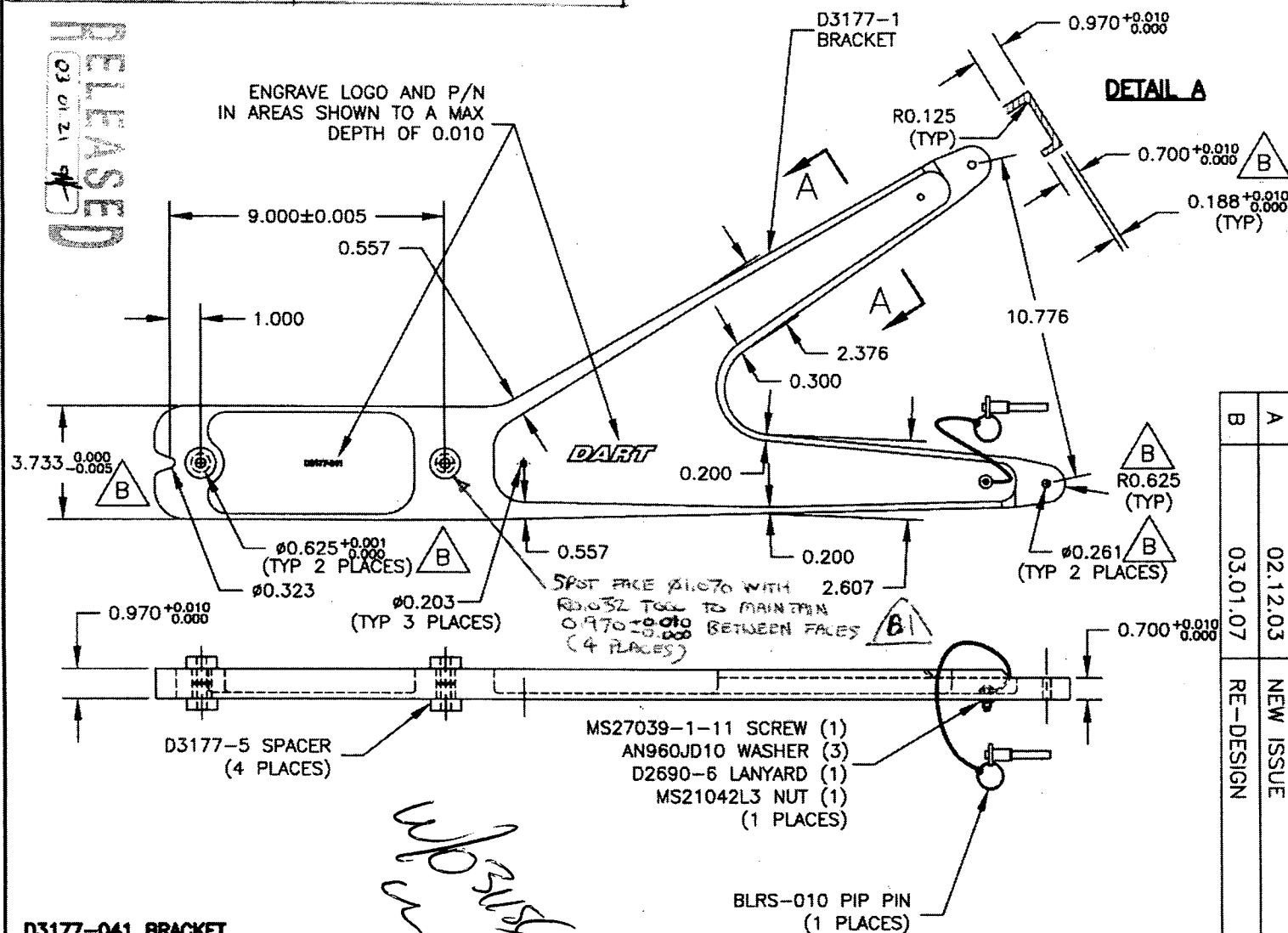
Measured by: SA	Audited by:	Prototype Approval:	N/A
Date: 07.03.	Date:	Date:	N/A

Rev	Date	Change	Revised by	Approved
A	04.02.25	New Issue	P/O D3177-041/-043 KJ/RF	TH

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03 01 21

B1	03.02.25	IP #	ADD SRT FILE
B2	03.11.24	IP #	ADD D3177-7





D3177-041 BRACKET

- 1) MACHINE D3177-1 PER DART DWG "D3177-1.SLDPRT"
MATERIAL: 6061-T6 ALUMINUM BAR (QQ-A-250/11 OR QQ-A-200/8)
(REF DART SPEC. M6061T6S OR M6061T6B)
- 2) BREAK ALL SHARP EDGES 0.005 TO 0.015
- 3) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1 (PRIOR TO ASSEMBLY)
POWDER COAT WHITE (4.3.5.1) PER DART QSI 005 4.3 (AFTER ASSEMBLY)
- 4) TOLERANCES ARE PER QSI 018 UNLESS OTHERWISE NOTED
- 5) ALL DIMENSIONS ARE IN INCHES

DART



DESIGN	DRAWN BY	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
CHECKED	APPROVED	DRAWING NO.	REV. B
		D3177	SHEET 1 OF 3
DATE	TITLE		SCALE
03.01.07	BRACKET		1:5
A	02.12.03	NEW ISSUE	
B	03.01.07	RE-DESIGN	

PLEASE PRINT

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D3177-043 BRACKET

1) MACHINE D3177-3 PER DWTG "D3177-3.SLDPR"

RELEASED
03 Jul 21

IN AREAS SHOWN TO A MAX DEPTH OF 0.010

D3177-3 BRACKET

9.000±0.005

1.000

3.733^{+0.000}/_{-0.005}

Ø0.625^{+0.001}/_{0.000} (TYP 2 PLACES)

Ø0.323

Ø0.203 (TYP 3 PLACES)

0.575

0.200

2.683

0.200

0.200

0.200

2.211

0.563

0.970^{+0.010}/_{0.000}

R0.125 (TYP)

DETAIL B

B

0.700^{+0.010}/_{0.000}

0.188^{+0.010}/_{0.000} (TYP)

10.776

B

R0.625 (TYP)

Ø0.261 (TYP 2 PLACES)

B

SPT FACE Ø1.070 WITH R0.032 TOOL TO MAINTAIN 0.970^{+0.010}/_{-0.000} BETWEEN FACES (4 PLACES)

B

0.970^{+0.010}/_{0.000}

D3177-5 SPACER (4 PLACES)

MS27039-1-11 SCREW (1)
AN960JD10 WASHER (3)
D2690-6 LANYARD (1)
MS21042L3 NUT (1)
(1 PLACES)

BLRS-010 PIP PIN (1 PLACES)

0.700^{+0.010}/_{0.000}

B

D3177-043 BRACKET

- 1) MACHINE D3177-3 PER DART DWG "D3177-3.SLDPRT" (1 PL)
MATERIAL: 6061-T6 ALUMINUM BAR (QQ-A-250/11 OR QQ-A-200/8)
(REF DART SPEC. M6061T6S OR M6061T6B)
- 2) BREAK ALL SHARP EDGES 0.005 TO 0.015
- 3) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1 (PRIOR TO ASSEMBLY)
POWDER COAT WHITE (4.3.5.1) PER DART QSI 005 4.3 (AFTER ASSEMBLY)
- 4) TOLERANCES ARE PER QSI 018 UNLESS OTHERWISE NOTED
- 5) ALL DIMENSIONS ARE IN INCHES

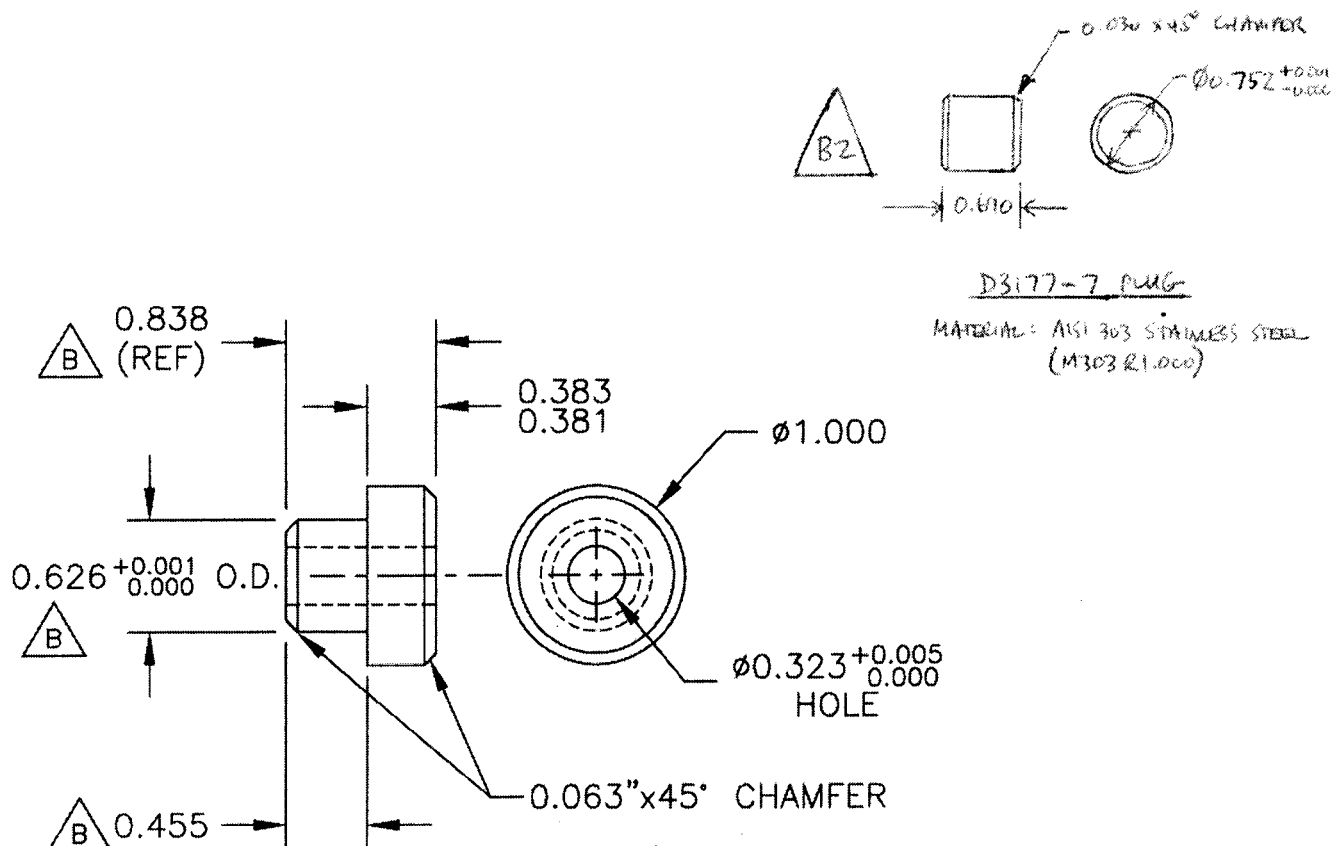
DART

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DESIGN	<i>CP</i>	DRAWN BY	<i>CP</i>	DARI AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA		REV. B
CHECKED	<i>[Signature]</i>	APPROVED	<i>[Signature]</i>	DRAWING NO.	D3177	SHEET 2 OF 3
DATE	03.01.07			TITLE	BRACKET SCALE 1:5	



DESIGN CP	DRAWN BY CP	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
CHECKED #	APPROVED #	DRAWING NO. D3177	REV. B SHEET 3 OF 3
DATE 03.01.07		TITLE BRACKET	SCALE 1:1



D3177-5

- 1) MATERIAL: 6061-T6 ALUMINUM BAR $\phi 1.000$
(QQ-A-200/8 OR QQ-A-225/8)
(REF DART SPEC. M6061T6R1.000)
- 2) BREAK ALL SHARP EDGES 0.005 TO 0.010
- 3) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
- 4) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED
- 5) ALL DIMENSIONS ARE IN INCHES

RELEASED
03 01 21

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Jason Murdoch

From: S Shahbazian [sshahbazian@dartaero.com]
Sent: Thursday, March 22, 2007 9:46 AM
To: 'Jason Murdoch'
Cc: 'L Lacelle'; 'C Bell'
Subject: RE: D3177 Parts not made to drawing

Jason,
Please scrap all D3177 parts.
Thanks
Serge

From: David Shepherd [mailto:dshepherd@dartaero.com]
Sent: March 22, 2007 9:42 AM
To: 'C Bell'
Cc: 'S Shahbazian'; 'L Lacelle'; 'Jason Murdoch'; 'S Shahbazian'
Subject: RE: D3177 Parts not made to drawing

Chris,

I'm not sure I agree with your assessment. Besides, I don't have the authority to change the analysis. Therefore, the D3177-041/-043 parts that were cut to 0.945" should be scrapped.

David

From: C Bell [mailto:cbell@dartaero.com]
Sent: Monday, March 19, 2007 12:25 PM
To: davids@dartaero.com
Cc: S Shahbazian
Subject: D3177 Parts not made to drawing

Hello,

Apparently, production has made a couple D3177-041 and D3177-043 Brackets with incorrect dimensions. The 0.970" thickness dimension was cut too short, to approximately 0.945". I've been punching the new number into the SR-D130-701-1 stress report to see if the brackets can still support the loaded basket.

Section C-C is the critical section for both parts. Using 0.945", and the method shown in SR-D130-701-1, the parts will yield (see Stress Analysis.pdf), so it looks like they are unacceptable, but I think the analysis is a little too conservative.

If you look at the calculations in Section 6.0 of the stress report you can see that 30" was used as the moment arm for Section C-C (distance from the section to the centroid of the bracket plus basket area), while Section A-A and Section B-B both used different (smaller) moment arms (from the section to the mounting hole). If you calculate the stress at Section C-C using a similar moment arm as A-A and B-B (from the section to the mounting hole, see Stress Analysis.pdf) the margin of safety is positive and acceptable. I don't see why a moment arm of 30" was used for Section C-C (except for being extra conservative) since the basket is not bending and the load on the part is actually applied to the mounting holes.

Do you think this deviation is acceptable or should the parts be scrapped?

Thanks,

Christopher Bell

3/22/2007